REMARKS

Claims 1-49 are pending. The Applicant's attorney has amended claims 27 and 33 to correct grammatical errors, but these amendments do not narrow claims 27 and 33 from their original scopes. As discussed below, all of the claims are now in condition for allowance. Furthermore, because the patent application discloses and claims relatively complex subject matter, the Applicant's attorney believes that he and the examiner may facilitate prosecution of this application by discussing it over the phone. Therefore, the Applicant's attorney requests that before the examiner issues a subsequent office action rejecting any claims, she teleconference with the Applicant's attorney re the application.

Rejection Of Claim 36 Under 35 U.S.C. § 112, First Paragraph, As Based On A Disclosure Which Is Not Enabling

The Applicant's attorney disagrees with this rejection because the disclosure enables a servo circuit that includes only one Viterbi detector; consequently, a second Viterbi detector is not critical or essential to the practice of the invention. For example, FIGS. 5-6 and paragraph [28], lines 25-27 of the patent application disclose that in one embodiment of the invention, the synchronous servo circuit 60 omits the Viterbi detector 78 (FIG. 5) and uses the Viterbi detector 100 (FIG. 6) inside of the sync-mark-and-polarity detector 62 to recover all of the servo data. That is, in this embodiment, the servo circuit 60 includes only a single Viterbi detector, which is the Viterbi detector 100. Also see paragraph [40] of the patent application.

Rejection Of Claims 1-5 Under 35 U.S.C. § 102(e) As Being Anticipated By U.S. Patent 6,144,513 to Reed

As discussed below, the Applicant's attorney disagrees with this rejection.

Claim 1

Claim 1 recites a determinator operable to determine the connection polarity of a read-write head.

For example, referring to FIG. 6 and paragraphs [34] – [37] of the patent application, a read-write head 14 (FIG. 1) reads a sync mark and other servo data from a magnetic storage disk 12 (FIG. 1), and generates a servo signal that includes the sync mark and other servo data. The head 14 is coupled to a Viterbi detector 100 with a connection polarity (head connection inverted or not inverted), and the detector 100 recovers the sync mark from the servo signal. A comparator 104 determines the connection polarity from the recovered sync mark. More specifically, by comparing the recovered sync mark to a stored (in register 106) noninverted copy of the sync mark, the comparator 104 can determine the connection polarity of the head 14. If the comparator 104 determines that the head connection is reversed, then the comparator can generate a signal that causes a phase-compensation circuit 64 to compensate for this reversed connection. If the comparator 104 determines that the head connection is not reversed, then no compensation is needed.

In contrast, Reed neither discloses nor suggests determining the connection polarity of a read-write head. For example, referring to col. 11, lines 12-67, in specific operational modes, Reed's circuitry merely measures the polarities (positive or negative) of pulses generated by a read-write head while reading servo data. But Reed includes no mention of using the measured pulse polarities to determine the connection polarity of the read-write head. Furthermore, one typically cannot determine the connection polarity from the measured pulse polarities only. That is, he typically needs additional information such as the pulse polarities expected when the connection of the read-write head is not reversed.

Rejection Of Claims 21-23, 27-33, and 36-41 Under 35 U.S.C. § 102(e) As Being Anticipated By U.S. Patent 6,108,151 to Tuttle

As discussed below, the Applicant's attorney disagrees with this rejection.

Claim 21

Claim 21 recites a comparator operable to determine the connection polarity of a read-write head.

Claim 21 is patentable over Tuttle for reasons similar to those recited above in support of the patentability of claim 1 over Reed. Specifically, col 19, line 10 – col. 20, line 11 of Tuttle is a virtually verbatim replica of Reed's column 11 (note that these two patents have a common assignee and some common inventors). Therefore, the reasons recited above in support of the patentability of claim 1 over Reed also support the patentability of claim 21 over Tuttle.

Claim 27

Claim 27 recites a comparator operable to determine the phase of a servo signal from a recovered synchronization mark.

For example, as discussed above in support of the patentability of claim 1, a comparator 104 determines the connection polarity of a read-write head 14 from a synchronization mark that a Viterbi detector 100 recovers, and in this example, the phase of the servo signal corresponds to the connection polarity. That is, if the connection of the read-write head 14 is not reversed, then the servo signal has a noninverted phase. Conversely, if the connection of the head 14 is reversed, then the servo signal has an inverted phase.

In contrast, Tuttle neither discloses nor suggests determining the phase of servo signal from a recovered synchronization mark. Referring to Tuttle's col 19, line 10 – col. 20, line 11, Tuttle discloses determining the polarities of individual servo pulses, but does not disclose or suggest using a recovered synchronization mark for this polarity determination.

Claims 33 and 36

Claims 33 and 36 are patentable for reasons similar to those recited above in support of the patentability of claim 27.

Claim 37

Claim 37 recites a Viterbi detector operable to recover a synchronization mark and other servo data from samples of a servo signal regardless of the phase of the servo signal.

For example, referring to FIGS. 6-7C and paragraphs [41] – [48] of the patent application, a read-write head 14 (FIG. 1) reads a sync mark and other servo data from a magnetic storage disk 12 (FIG. 1), and generates a servo signal that includes the sync mark and other servo data. The head 14 is coupled to a Viterbi detector 100 with a connection polarity — the phase of the servo signal corresponds to the head's connection polarity — that can either be inverted (head connection reversed) or noninverted (head connection not reversed), but the detector 100 recovers the sync mark (and may also recover other servo data) from the servo signal regardless of the connnection polarity.

In contrast, Tuttle neither discloses nor suggests a Viterbi detector that can recover a synchronization mark and other servo data from samples of a servo signal regardless of the phase of the servo signal. For example, referring to col. 19, lines 20-67, Tuttle merely discloses a peak detector for recovering servo data. But nowhere does Tuttle disclose or suggest a Viterbi detector for recovering servo data, let alone a Viterbi detector that can recover a synchronization mark and other servo data regardless of the phase of the servo signal.

Claim 38

Claim 38 recites recovering servo data from a servo signal having a phase that represents the connection polarity of a read head and determining the phase of the servo signal from the recovered servo data.

For example, referring to FIG. 6 and paragraphs [34] – [37] of the patent application, a read-write head 14 (FIG. 1) reads a sync mark and other servo data from a magnetic storage disk 12 (FIG. 1), and generates a servo signal that includes the sync mark and other servo data. The head 14 is coupled to a Viterbi detector 100 with a connection polarity (head connection reversed or not reversed), and the servo signal has a phase that represents the connection polarity. The Viterbi detector 100 recovers the sync mark from the servo signal, and a comparator 104 determines the connection polarity, and thus the phase of the servo signal, from the recovered sync mark. More specifically, by comparing the recovered sync mark to a stored (in register 106) noninverted copy of the sync mark, the comparator 104 can determine the phase of the

servo signal (*i.e.*, the connection polarity of the head 14). If the comparator 104 determines that the phase is inverted (head connection is reversed), then the comparator can generate a signal that causes a phase-compensation circuit 64 to compensate for this inverted phase. If the comparator 104 determines that the phase is noninverted (head connection is not reversed), then no compensation is needed.

In contrast, Tuttle neither discloses nor suggests determining the phase of a servo signal from recovered servo data where the phase represents the connection polarity of a read head. Referring to Tuttle's col 19, line 10 – col. 20, line 11, Tuttle discloses determining the polarities of individual servo pulses. But Tuttle does not disclose or suggest that these polarities are indicative of a servo-signal phase that represents a connection polarity of a read head, nor does he disclose or suggest determining this servo-signal phase from recovered servo data.

Rejection Of Claims 43-48 Under 35 U.S.C. § 102(b) As Being Anticipated By U.S. Patent 5,822,143 to Cloke

As discussed below, the Applicant's attorney disagrees with this rejection.

Claim 43

Claim 43 recites calculating a respective path metric for each of no more than two possible states of a binary sequence.

For example, referring to FIGS. 6 and 7C of the patent application, the Viterbi detector 100 calculates a respective path metric for each of no more than two possible states — here S0 and S3 — of a binary sequence. That is, the Viterbi detector 100 calculates respective path metrics for the possible states S0 and S3, but calculates no path metrics for the possible states S1 and S2.

In contrast, referring, for example, to FIGS. 1, 1A, 1B, and 1C, regardless of its implementation (PR4, PR4 rate 8/10, or EPR4), Cloker's Viterbi detector 111 calculates path metrics for each of more than two possible states of a binary sequence. For example, referring to FIG. 1A, in the PR4 implementation, Cloker's Viterbi detector 111 calculates path metrics for all four possible states 00, 10, 01, 11.

Claim 45

Claim 45 recites sampling a signal that represents a binary sequence, and, for each pair of samples, calculating multiple path metrics for no more than two possible states of the binary sequence.

For example, referring to FIGS. 6 and 7C of the patent application, for each pair of samples, the Viterbi detector 100 calculates multiple path metrics for no more than two possible states — here S0 and S3 — of a binary sequence. That is, the Viterbi detector 100 calculates multiple metrics for each of the the possible states S0 and S3, but does not calculate multiple path metrics for the possible states S1 and S2.

In contrast, referring, for example, to FIGS. 1, 1A, 1B, and 1C, expanding out the trellis diagrams of FIGS. 1A-1C for two-sample-at-a-time operation, Cloker's Viterbi detector 111 calculates multiple path metrics for more than two possible states of a binary sequence. For example, referring to FIG. 1A, in the PR4 implementation, Cloker's Viterbi detector 111 calculates multiple path metrics for each of the four possible states 00, 10, 01, 11.

Claim 47

Claim 47 recites sampling a signal that represents a binary sequence, for each pair of samples calculating a difference between path metrics for two possible states of the binary sequence, and determining a surviving path from the difference.

For example, referring to FIG. 6 and paragraphs [49] – [56] of the application, for each pair of samples, the Viterbi detector 100 calculates a difference between the path metrics for two possible states — here S0 and S3 — of a binary sequence, and determines a surviving path from this calculated difference.

In contrast, referring, for example, to FIGS. 1 and 2 and column 11, lines 51-60, Cloker neither discloses nor suggests that his Viterbi detector 111 determines a surviving path (converged and stored in the detector paths 212) from a difference between the path metrics of two possible states of a binary sequence.

Rejection Of Claims 6-20, 24-26, 34-35, and 42 Under 35 U.S.C. § 103(a) As Being Unpatentable Over Tuttle In View Of Cloke

As discussed below, the Applicant's attorney disagrees with this rejection.

Claim 6

Claim 6 recites a recovery circuit operable to calculate a respective path metric for each of no more than two possible states of a binary sequence.

For example, referring to FIGS. 6 and 7C of the patent application, the Viterbi detector 100 includes a recovery circuit that is operable to recover a binary sequence from a signal by calculating a respective path metric for each of no more than two possible states — here S0 and S3 — of the binary sequence. That is, the recovery circuit calculates respective path metrics for the possible states S0 and S3, but calculates no path metrics for the possible states S1 and S2..

In contrast, the combination of Tuttle and Cloke fails to teach or suggest calculating a respective path metric for each of no more than two possible states of a binary sequence. The examiner admits (in the office action) that Tuttle lacks this teaching. And as discussed above in support of the patentability of claim 43, Cloke also lacks this teaching because his Viterbi detector 111 (FIG. 1) calculates path metrics for each of more than two possible states of a binary sequence (FIGS. 1A-1C).

Claim 13

Claim 13 recites a recovery circuit operable, for each pair of samples of a signal that represents a binary sequence, to calculate multiple path metrics for no more than two possible states of the binary sequence.

For example, referring to FIGS. 6 and 7C of the patent application, for each pair of samples, the Viterbi detector 100 includes a recovery circuit that calculates multiple path metrics for no more than two possible states — here S0 and S3 — of a binary sequence. That is, the Viterbi detector 100 calculates multiple metrics for each of the the possible states S0 and S3, but does not calculate multiple path metrics for the possible states S1 and S2.

In contrast, the combination of Tuttle and Cloke fails to teach or suggest calculating multiple path metrics for no more than two possible states of a binary sequence referring. The examiner admits (in the office action) that Tuttle lacks this teaching. And as discussed above in support of the patentability of claim 45, Cloke also lacks this teaching because Cloke's Viterbi detector 111 (FIG. 1) calculates multiple path metrics for more than two possible states of a binary sequence (FIGS. 1A-1C).

Claim 20

Claim 20 recites a recovery circuit that, for each pair of samples of a signal that represents a binary sequence, is operable to calculate a difference between path metrics for two possible states of the binary sequence and to determine a surviving path from the difference.

For example, referring to FIG. 6 and paragraphs [49] – [56] of the application, for each pair of samples, the Viterbi detector 100 includes a recovery circuit operable to calculate a difference between the path metrics for two possible states — here S0 and S3 — of a binary sequence, and determines a surviving path from this calculated difference.

In contrast, the combination of Tuttle and Cloke fails to teach or suggest calculating a difference between path metrics for two possible states of a binary sequence and determining a surviving path from the difference. The Tuttle fails to disclose this teaching. And, as discussed above in support of the patentability of claim 47, Cloke neither discloses nor suggests that his Viterbi detector 111 (FIG. 1) calculates a difference between path metrics for two possible states of a binary sequence or determines a surviving path (converged and stored in the detector paths 212) from such a difference.

Claims 24-26

Claims 24-26 are patentable by virtue of their dependencies from independent claim 21.

Claims 34-35

Claims 34-35 are patentable by virtue of their dependencies from independent claim 33.

Claim 42

Claim 42 is patentable by virtue of its dependency from independent claim 38.

Rejection Of Claim 34 Under 35 U.S.C. § 103(a) As Being Unpatentable Over Tuttle In View Of U.S. Patent 6,490,110 To Reed

Claim 34 is patentable by virtue of its dependency from independent claim 33.

CONCLUSION

In view of the foregoing, the Applicant's attorney believes that claims 1-26, 28-32, and 34-49 as previously pending and claims 27 and 33 as amended are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes that a telephone conference would expedite prosecution of this application as discussed above, please telephone the undersigned at (425) 455-5575.

Respectfully submitted,

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Dated: March 8, 2004

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